30 Nicotine Infusion in Man Stimulates Plasma-Vasopressin, -ACTH and -Cortisol in a Dose Dependant Manner

J. Stalke, O. Hader, J. Hensen, V. Bähr, G. Scherer* and W. Oelkers
Division of Endocrinology, Department of Medicine, Klinikum Steglitz, Freie Universität Berlin, FRG
*Analytisch-Biologisches Forschungslabor Prof. Adlkofer, München, FRG

Nicotine has an antidiuretic effect, which is supposed to be mediated by vasopressin (Husain et al). According to Goldsmith et al. vasopressin release is stimulated by nicotine only if nausea occurs. Rowe et al. infused nicotine into healthy subjects in order to obtain nicotine plasma levels similar to those during smoking. While smoking stimulated vasopressin release, nicotine infusion failed to do so. The authors concluded that vasopressin stimulation due to smoking was mediated by an airway-specific mechanism.

The present study investigates the response of plasma-vasopressin (AVP), -ACTH and -cortisol to nicotine infusion in man. Seven male, healthy, non-smoking subjects were each studied three times, receiving nicotine infusions of 0.5 , 1.0 and 2.0 µg/kg body weight/min respectively over 20 minutes on different days. Blood pressure and heart rate were measured frequently before and during infusion. All symptoms reported by the subjects were carefully protocolled. Blood was drawn twice at baseline and 5, 10, 15, 20, 25, 30, 40, 55 and 70 minutes after starting the infusion. Plasma AVP, -ACTH and -cortisol were measured using specific radioimmunoassays, plasma nicotine by gas-chromatography after extraction.

Plasma nicotine rose during infusion in a dose-dependant manner to peak levels of about 5, 10 and 20 ng/ml respectively in the three experiments. The lowest dose of nicotine caused mild lightheadedness and a feeling of arousal in three subjects but no changes in hormone levels. Infusion of the medium dose led to lightheadedness in most subjects and to mild nausea in one. There was a clear-cut rise of the three hormones measured. 2.0 µg/kg b.w./min of nicotine led to nausea in four subjects and to lightheadedness in the others. AVP, ACTH and cortisol rose more pronounced than in the medium dose group.

Thus, intravenous nicotine infusions led to dose-dependant increments of plasma nicotine, -AVP, -ACTH and -cortisol. The threshhold for the stimulation of all parameters measured is between 0.5 and 1.0 µg/kg b.w./min of nicotine infusion. The occurance of nausea was not a prerequesite for the stimulation of AVP release. The activation of all variables measured in this study at a similar threshold dosage of nicotine suggests a common basic mechanism at a nicotinergic receptor site. It is also possible that stimulation of AVP and ACTH by the same threshold dose of nicotine reflects corticotropin (ACTH) release by AVP.

Husain M.K. et al., J. Clin. Endocrinol. Metab. 41, 1113, 1975
Goldsmith S.R. et al., Clin. Pharmacol. Ther. 44, 478, 1988
Rowe J.W. et al., J. Clin. Endocrinol. Metab. 51, 170, 1980

2021546638

Source: https://www.industrydocuments.ucsf.edu/docs/lgvl0000